MINISTRY OF SOCIAL WELFARE

JERUSALEM, ISRAEL

R E P O R T No. 2

RESEARCH ON REHABILITATION OF BLIND AND VISUALLY HANDICAPPED IN OPERATING IBM PUNCH-CARD MACHINES

B y

YEHUDA SCHIFF & EZRA SHAPIR

Prepared under a grant from the Vocational Rehabilitation Administration, Department of Health,Education and Welfare,Washington D.C., U.S.A.

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MINISTRY OF SOCIAL WELFARE
JERUSALEM, ISRAEL
in cooperation with
The Office Mechanisation Centre
The IBM World Trade Corporation (ISRAEL Branch)
The Jewish Institute for the Blind

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Y. SCHIFF - Programme Director

E. SHAPIR - Technical Engineer - Chief Investigator.

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C O N T E N T S

	Page
Foreword	i
Improvement of Work Methods on IBM Sorter 083	1
Theoretical Lessons for IBM Sorter 083	9
List of Special Aids	29
Exercises for Operation of IBM Sorter 083	33
Sorting Exercises	49
General Instructions	51
Development of Card-Checking Instrument	52
APPENDIX: Memorandum on the Future Development of the Research and Demonstration Project.	

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F O R E W O R D

(Some Considerations on Automatic
Data-Processing by the Blind)

By Dov Chevion, Principal Investigator.
Director of The Office Mechanisation
Centre.

Report No. 2 provides a valuable opportunity to review some of our achievements in the training of blind in Automatic Data-Processing (ADP) and our plans for the continuation of the research, as well as considering trends for future development.

1. We present herein a detailed outline of a course of instruction for the blind in the operation of a punch-card sorter machine. This report is based on experience with the IBM Sorters, but fundamentally it can, without difficulty, be adapted to sorters of any other system of punchcards.

The course is broken down into lessons which are accompanied by revision questions and exercises, and include demonstration aids.

2. It has been found - a fact which we wish to stress - that basically the syllabus outlined deviates in the theoretical field insignificantly from a syllabus for sighted students. For these theoretical explanations, for

which vision is indispensable or even desirable, appropriate explanation or performance devices have been substituted. The respective aids for tactual explanations, and especially the original instrument developed for the checking of sorting, are explained at length, with illustrations, in the report.

3. While scrutinizing the proposed course for the sorter, as well as the version of the checking instrument, the most exhaustive and extensive studies for overcoming one difficulty after another, until this stage was achieved, should not be overlooked. It can even be assumed that the proposed checking instrument for sorting is of value to sighted operators and may under certain circumstances increase their productivity.

4. The length of the lessons and their job breakdown has to be empirically validated by future courses. Deviations for small and heterogeneous classes have to be taken into account (this is always a difficulty for any standard course recommended for teachers).

Some validation is also required for the checking instrument and other aids, which might require additional development during the further phases of research.

5. The Sorter serves here, in a sense, as the pilot machine for our research. Courses for other punchcard machines will appear in the next report, in which additional results in regard to training and research will also be included.

6. While Report No. 2 shows quite clearly that the technical problems in regard to the sorter, as well as in regard to other punchcard machines, might have been solved in a satisfactory manner, certain human problems still lie before us, such as:

a) What are the minimum requirements in regard to character and educational qualifications for a good punchcard operator, especially a blind operator?

b) How should the training achievements be evaluated? This problem has not yet been solved in a wholly satisfactory manner in relation to sighted persons, and it exists to an even greater extent in relation to the blind. Several methods have so far been developed but we feel that the final solution has not yet been found.

The human aspect will be dealt with in our next report. However, the small size of our sample, as well as the great heterogeneity of the trainees, make it extremely difficult for us to come to any definite and objective conclusions in this respect.

7. It is now time to consider the future trends of ADP. This is a general question which exists all over the world, but it is of particular importance for fast-developing countries such as Israel, especially when the professional training of the blind is taken into account. There is no doubt that difficulties might be created if our professional training of the blind is limited to the conventional punch-card machines only, in view of the increasingly wide usage of computers equipped with punchcard and magnetic tape input and output. A combination of punchcard input and output computer and auxiliary punchcard machines will probably be characteristic, in the not-too-distant future, for many installations in Israel.

This new trend was the main reason for the inclusion in our present research of a course for computer programming as well. We have been strengthened in our belief that this might bring good results by the investigations and experiments performed by the Computer Department of the College of

Medicine, Cincinnati. We have been in close touch with the Director, Dr T. Sterling, and his aides, and have exchanged information on the results of the training of the blind in the field of computer programming in respect to the punch-card input and output 1401 IBM Computer.

It might, therefore, be interesting to stress now in short some of our professional results in the training of the blind in programming for Punchcard 1401 Computer, which we see as a natural development of our research.

The first group was composed of 5 blind students, of whom we hope that perhaps three or four will succeed as programmers. The background of these students was not uniform (2 have the first academic degree and 3 are high-school graduates) and also the method of their selection was not sufficiently systematic, so that we can as yet not draw any conclusions regarding possible successes and failures through proper selection of students in the future.

During the course we were surprised to find that the technique of teaching programming to the blind need not differ greatly from that for sighted people. We have made great efforts to minimise the necessity for demonstration in the explanations of programming and performance of exercises. It is clear that in all functions which are funda-

mentally logical no differences exist between the sighted and the blind pupil. Tactual aids have to be provided when flow diagram problems arise and debugging of programmes, which have to be written in braille by the computer.

Demonstration aids, which are very important here, have been developed. It is anticipated that a satisfactory solution will be found for both these problems.

Also, the fact that a blind pupil participated, experimentally, in a course of programming for sighted people (although he was given special help by our Chief Investigator during the whole course, and also his aptitude was far above the average) is a valid indication that: a) it is possible satisfactorily to train blind people in programming, and b) there is probably only a slight necessity to change radically the method of training the sighted for the blind, besides, of course, the necessity for special aids for flow diagrams and debugging problems, as mentioned above.

The aim in our training of the blind in the operation of punchcard machines and in our short experiment in programming a small group in a punchcard computer, is to make the blind person independent to the maximal extent of any help from others while being regularly employed in a computer and

punchcard installation. It is possible for this to be achieved to a great extent in respect to the various punchcard machines, and to an even greater degree in respect to the programming field.

In concluding our observations, which are of course provisional while the research is in progress, it might be said that:

a) good results have so far been achieved by blind operators trained by us in Course No. 1 and placed in various punchcard installations. With the exception of one operator, all the rest, 7 in number, have validated our belief that a blind person can perform productive work as a punchcard operator;

b) The question of the proper selection of candidates amongst the blind for punchcard machine training still remains a problem;

c) The future trend of ADP has to be taken into account in our next training syllabus. Proper selection of candidates in this respect is also of great importance.

We hope, therefore, that in the following phases of our research it will be possible for us to prove that the training of the blind in ADP, commencing with punchcard machines, will be flexible enough to be adapted to the constant changes in the ADP methods.

IMPROVEMENT OF WORK METHODS ON IBM SORTER 083

The final chapter of Report No. 1 gave the result of analysis of the work of several experienced sighted operators. This job breakdown has been re-elaborated and improved, and consequently analyzed for the purpose of instructing the blind.

Operations requiring the use of vision in any way were particularly examined, and were divided into two categories, as follows:-

i) Vision desirable

ii) Vision indispensable

It appears that, as opposed to the fairly large number of operations in which vision is of assistance in the performance of the work, there are only two operations in which vision is indispensable.

As the trainees are blind, all the operations for which vision is desirable have to be performed by touch. With the acquisition of experience and ease in recognizing different parts of the machine, a high speed is achieved.

For the operations for which vision is indispensable it was necessary to build a special braille scale (see illustration on page 41) and a special instrument to aid in the

performance of the work. This instrument, as described on page 52, was developed and improved a number of times. It is anticipated that perhaps sighted operators will also be able to benefit from it as it not only prevents the eyes from tiring, but saves time and physical strain.

The job breakdown of the practical work on the Sorter as analyzed and improved is given hereunder. This constitutes a basis for compiling sets of practical exercises for blind trainees for operating IBM Sorter 083.

L E G E N D

☼	WORK
€	HOLD
⇨	TRANSPORT LOADED
⇦	TRANSPORT EMPTY
○	IDLE
◈	VISION DESIRABLE
◈◈	" INDISPENSABLE

OPERATION : Brush adjustment

MACHINE : IBM sorter 083 (with file feed)

No.	Left Hand	Mark	Eye	Mark	No.	Right Hand
1	Goes to start key	←	◈	←	1	Goes to main line switch
2	Presses start key to test machine's Operation	☼		☼	2	Switches main line to - OFF
3	Goes to magnet's upper cover	←	◈	←	3	Goes to file feed
4	Supports cover	€		☼	4	Supports file feed
5	Pulls cover to open	☼		☼	5	Pulls file feed to right
6	Goes to brush holder	←	◈	←	6	Goes to column selector knob
7	Holds brush holder	€		€	7	Holds column selector knob
8	Pulls locking key 90° to left with thumb	☼		☼	8	Turns column selector knob 1/6 turn left
9	Takes out brush holder	☼		○	9	Idle
10	Transfers brush holder to right hand by turning it 180° vertically	⇀		⇀	10	Receives brush holder from left hand
11	Goes to brush clamp nut	←		⇀	11	Transfers to brush gage by turning it 90° horizontally
12	Opens brush clamp nut	☼	◈	☼	12	Arranges brush holder on brush gage while putting finger on brush
13	Closes brush clamp nut	☼		☼	13	Presses brush to gage
14	Receives brush holder from right hand	⇀		⇀	14	Transfers brush holder to left hand by turning brush 90° towards operator
15	Holds brush holder	€		☼	15	Closes brush clamp nut tightly
16	Transfers brush holder to right hand, by turning it 90°, while brush is left of operator	⇀		⇀	16	Receives brush holder from left hand
17	Helps adjusting (to prevent damage to brush)	☼	◈	⇀	17	Transfers to brush gage
18	Helps adjusting (to prevent damage to brush)	☼	◈	☼	18	Adjusts on brush gage
19	Receives brush holder from right hand	⇀		⇀	19	Transfers brush holder to left hand by turning brush 180° upward
20	Transfers brush holder to brush holder mount by turning brush 90° down	⇀	◈	←	20	Goes to column selector knob
21	Adjusts brush holder on brush holder mount	☼		€	21	Holds column selector knob
22	Pushes down locking key with thumb	☼		☼	22	Turns column selector knob 1/6 turn right
23	Goes to magnets' upper cover	←	◈	←	23	Goes to main line switch
24	Supports magnets' upper cover	☼		☼	24	Switches main line switch to - ON
25	Closes magnets' upper cover	☼	◈	←	25	Goes to start key
26	Goes to file feed lock handle	←		☼	26	Pushes start key
27	Pulls file feed	☼		☼	27	Pushes stop key

OPERATION : Brush adjusting and counter resetting

MACHINE : IBM sorter 083

No.	Left Hand	Mark	Eye	Mark	No.	Right Hand
1	Goes to finger lever of brush holder	←	◈	←	1	Goes to start key
2	Holds finger lever of brush holder	€		☼	2	Pushes start key (to check machine's operation)
3	Pulls finger lever of brush holder	☼		←	3	Goes to column selector knob
4	Transfers column indicator to chosen column	→	◈	☼	4	Turns column selector knob 1/6 turn to left
5	Goes to counter reset key	←	◈	€	5	Holds column selector knob
6	Turns counter reset key till counter zeroes	☼	◈	☼	6	Turns column selector knob 1/6 turn to right

OPERATION : Machine and keys checking and resetting

1	Goes to digit suppression keys	←	◈	←	1	Goes to checking cards
2	Runs a fingertip along the bottom edge of the keys	☼		☼	2	Takes two prepared cards (one of tenths, one of units)
3	Goes to Sort Selection Switch	←	◈	→	3	Holds checking cards and goes to feed hopper
4	Turns Sort Selection Switch to N	☼		☼	4	Holds checking cards and opens hinged joggle plate
5	Goes to edit switch	←	◈	☼	5	Holds checking cards and takes out card weight
6	Turns edit switch	☼		☼	6	Puts cards into feed hopper (face down, column 1, towards operator)
7	Goes to start key	←	◈	☼	7	Puts card weight on the cards (in the feed hopper)
8	Presses start key	☼		☼	8	Closes hinged joggle plate
9	Goes to a pocket in which a card fell	←	◈	←	9	Goes to a pocket in which a card fell
10	Takes out one of the cards and examines into which pocket it fell, by comparing with column indicator's place	☼	◈	☼	10	Takes out one of the cards and examines into which pocket it fell by comparing with column indicator's place

OPERATION : Arrangement of carriage and material for machine feeding

MACHINE : IBM sorter 083

No.	Left Hand	Mark	Eye	Mark	No.	Right Hand
1	Helps with precising	☼	◈	☼	1	Directs carriage with boxes facing operator
2	Goes to box cover	←		←	2	Goes to the box
3	Opens box cover (making a complete turn	☼		☼	3	Pushes cards away from operator
4	Goes past 500 - 600 cards in the box	←		€	4	Holds first group of 500 - 600 cards
5	Holds a group of approx. 5 cm. of cards	€		☼	5	Takes out the group of 500 - 600 cards
6	Pulls the group of cards towards operator	☼		€	6	Holds group of cards outside of box
7	Puts the group of cards leaning against the rest of the cards, to support them	☼	◈	→	7	Transfers group of cards to machine's upper cover to joggle it before putting into feed hopper

OPERATION : Feeding cards to sorter from a box or from a card rack

MACHINE : IBM sorter 083

1	Helps in holding the group of cards	☼		€	1	Holds a group of cards from a box or from a card rack
2	Goes to start key	←	◈	→	2	Transfers the group of cards to the feed hopper
3	Pushes start key (waits until it stops automatically)	☼		☼	3	Puts the group of cards in the feed hopper
4	Idle	o		☼	4	Knocks on the side of the group of cards 1-2 times to straighten it
5	Idle	o	◈	←	5	Goes to hinged joggle plate
6	Idle	o		☼	6	Opens hinged joggle plate
7	Idle	o		€	7	Holds the card weight (from the bottom of the of the feed hopper)
8	Idle	o		☼	8	Takes out the card weight
9	Idle	o	◈	☼	9	Arranges the first cards in the feed
10	Pushes start key	☼		☼	10	Closes the hinged joggle plate
11	Idle	o		☼	11	Puts the card weight on the cards of the feed hopper

OPERATION : Taking cards out of a pocket, checking and inserting in the feed hopper in a card rack

MACHINE : IBM sorter 083

No.	Left Hand	Mark	Eye	Mark	No.	Right Hand
1	Goes to the pocket joggler	←		←	1	Goes to stop key
2	Pulls pocket joggler open				2	Presses stop key
3	Idle	○		←	3	Goes to a full pocket
4	Idle	○			4	Pushes cards down (making room for exit)
5	Closes pocket joggler			→	5	Transfers cards to upper machine's cover
6	Helps to put cards on upper machine's cover (right side)				6	Puts the cards on upper machine's cover
7	Knocks on the left of the cards 2-3 times to straighten them				7	Clasps the group of cards
8	Clasps the group of cards				8	Knocks on top of the cards (2-3 times)
9	Lifts the group of cards to eye level (towards operator)	→		→	9	Lifts the group of cards to eye level (towards operator)
10	Checks the group of cards				10	Checks the group of cards
11	Brings down the group of cards and turns it face down, one column (1st) towards operator	→		→	11	Helps bring down the group of cards
12	Transfers the cards to the feed hopper or to a card rack	→		→	12	Helps to transfer the cards to feed hopper or to a card rack
13	Puts the cards in the feed hopper or a card rack				13	Helps put the cards in the feed hopper or a card rack

Note: On this job tasks of hands can be changed, depending on the place of the full pocket and the comfort of the operator.

OPERATION : Taking cards out with both hands from two full pockets and putting them parallel on upper machine's cover or into 2 card racks

MACHINE : IBM sorter 083

No.	Left Hand	Mark	Eye	Mark	No.	Right Hand
1	Idle	○	◈	←	1	Goes to the pocket joggler
2	Idle	○		☼	2	Pulls pocket joggler open
3	Goes to left full pocket	←	◈	←	3	Goes to right full pocket
4	Pushes cards downward (making room for exit)	☼		☼	4	Pushes cards downward (making room for exit)
5	Transfers the cards parallel to upper machine's cover or into 2 card racks	→	◈	→	5	Transfers cards parallel to upper machine's cover or into 2 card racks
6	Puts the cards parallel on upper machine's cover or into 2 card racks	☼		☼	6	Puts cards parallel on upper machine's cover or into 2 card racks
7	Goes to the pocket joggler	←		←	7	Goes to the start key
8	Closes the pocket joggler	☼		☼	8	Pushes the start key

Note: On this job, tasks of hands can be changed, depending on the place of the full pocket and the operator's comfort.

OPERATION : Taking cards out from a pocket and inserting in a box

MACHINE : IBM sorter 083

No.	Left Hand	Mark	Eye	Mark	No.	Right Hand
1	Goes to the pocket joggler	←	◈	←	1	Goes to stop key
2	Pulls pocket joggler open	☼		☼	2	Presses stop key
3	Idle	○	◈	←	3	Goes to a full pocket
4	Idle	○		☼	4	Pushes cards down (making room for exit)
5	Closes pocket joggler	☼	◈	→	5	Transfers cards to upper machine's cover
6	Helps to put cards on upper machine's cover (right side)	☼		☼	6	Puts the cards on upper machine's cover
7	Knocks on the left of the cards 2-3 times to straighten them	☼		€	7	Clasps the group of cards
8	Clasps the group of cards	€		☼	8	Knocks on top of the cards (2-3 times)
9	Lifts the group of cards to eye level (towards operator)	→		→	9	Lifts the group of cards to eye level (towards operator)
10	Checks the group of cards	€	◈◈	€	10	Checks the group of cards
11	Brings down the group of cards and turns it face down	→		→	11	Helps bring down the group of cards
12	Goes to the box	→	◈	→	12	Transfers cards to a box
13	Pulls forward the cards which are in the box (if any) to make room for new ones	☼		☼	13	Puts cards into the box
14	Presses the cards on all sides to ease covering	☼		☼	14	Presses the cards from all sides to ease covering
15	Goes to box cover	←		←	15	Goes to box cover
16	Pulls box cover	☼		☼	16	Pulls box cover
17	Puts the cover into the box (closes the box)	☼		☼	17	Puts cover into the box (closes the box)
18	Knocks on the box to close it tightly	☼		☼	18	Knocks on the box to close it tightly

PROGRAMME OF THEORETICAL LESSONS

FOR IBM SORTER 083

The programme of theoretical lessons described hereunder is based on our experience with a class of eight trainees. The lessons are composed in the form of lectures of 2 hours each. Each lesson comprises the basic outlines for guiding the instructor in his lectures and gives relevant numbers of special aids for explanation to the blind. A detailed description, with photographs, of these aids appears on Page 29 .

The programme offers the trainees three lectures a day. After each day of study the trainees are given revision questions on the material studied the previous day.

Before commencing with the lectures it is advisable to refresh the trainees' memory by discussing the questions which appear in the programme.

Lesson No. 10 presents the transitory stage between the theoretical lectures and the practical work. This lesson is planned for four hours. As this is the stage at which the machine is introduced to the trainees for the first time, the lesson should be given to each trainee individually.

The total time necessary for Lesson No. 10 depends on the number of trainees participating in the course and on the number of Sorters at the installation. This lesson may be

given simultaneously to two trainees - by the teacher of the theoretical part, and also by the instructor in the machine room who, from this stage onwards, instructs the trainees in their practical work.

LESSON NO. 1

GENERAL INTRODUCTION TO THE CONCENTRATION AND PROCESSING OF DATA

1. The necessity of concentrating data for business or administration purposes (e.g. population census, cost accounting, payroll, income tax accounting).
2. Different methods of processing data (lists, card files, films, etc.).
3. Card files:
   a) For example, personal pupil's card at school, income tax card.
   b) The contents of the card (the data which appears on it and identification number).
   c) Manner of handling the file (from the physical point of view) and the order of the cards.
   d) Use of card files.
   e) Advantages of the use of card files as opposed to other methods of concentrating data.
4. The limitations of card files handled manually, and the advantages of automatic data-processing.

LESSON NO. 2

THE IBM CARD AND ITS CHARACTERISTICS

Subject	No. of Aid	Means of Determination
1. The material of which the card is made. 2. The form of the card and its measurements. 3. Face, back, top, bottom.	1	Finger the card; feel its thickness, length and breadth; distinguish the cut side.
4. The structure of the card (80 columns, 12 characters in each column, fixed place for columns and characters). 5. The printing on the card (number of columns and digits 0-9).	2	Hold the card face upwards, read the rows, read the columns. Read figures 1-8, indicating columns 10-80.
6. Kinds of cards (various colours, the place of side cuts, form card).	3	For totally blind: finger a card without a cut side. For partially blind: observe the differences between the various cards.

Subject	No. of Aid	Means of Determination
7. The standard box and carton container.	4	Lift the carton and assess its weight. Open the carton and count the boxes. Take out one box, open it and finger the cards in it.
8. The form of the punch in the card. 9. The meaning of the punch in a column. 10. Digit punches 0-9, Zone punches 11-12.	5	Finger the punches in field 10-19. Examine the distances between columns and between rows. Finger the punches in field 1-2 and compare them with the punches in columns 18-19.
11. Numerical punch. 12. Alphabetical punch (the principle and the code, digital 0 and zone 0. 13. Other characters.	6	Finger the field containing numerical punches. Finger the field containing double punch in each column (Alphabetical punch).

Subject	No. of Aid	Means of Determination
14. Standard cards (units, tens, alphabetical) and their meaning.	7	Finger a standard units card. Finger a standard tens card. Finger a standard alphabetical card. Observe the differences between them.

LESSON NO. 3

INSERTING DATA IN IBM CARDS

Subject	No. of Aid	Means of determination
1. <u>Fields</u>:		
a) Definition; determining the number of columns in accordance with needs (with possibility of variation).		
b) Numerical field; filling in zeroes from the left side of the field (e.g. identification number, monthly salary, etc.).	8	Finger field 1-13
c) Alphabetical field. (E.g. name, surname).		Finger field 14-28
d) Alpha-numerical field. (E.g. address - name of city and street, house number).		Finger field 29-42

Subject	No. of Aid	Means of determination
e) Code field; the technical meaning and advantages. (E.g. country of origin, months, etc.).		Finger field 61-62
2. Fixed components in a card programme. a) The sign of the card (file).	9	Find X in column 80.
b) Identification field (fixed data). c) Other fields (fixed or variable data). d) Technical signs. e) Positions 11, 12 - place for interpretation (for checking).		
g) End print (E.g. date, continuous number).	10	For partially sighted trainees: observe what is printed.

REVISION QUESTIONS

1. How many columns are there on a card?
2. How many positions in a column?
3. In what order do the positions appear in the column?
4. What are the methods of distinguishing between the various card files?
5. What is the meaning of the word "field"?
6. In what instances do mixed alpha-numerical fields appear?
7. Why does one fill in the left of the numerical field with zeroes?
8. How does the code field help?
9. Why are the positions 11 and 12 not marked on the cards?
10. Give one of the following in machine code: First name, surname, address, house number, identification certificate number.

LESSON NO. 4

HOW IBM MACHINES READ INFORMATION

Subject	Aid No.	Means of Determination
1. The principle by which IBM machines read information.		
2. The brush, the roller and the punch.	11	Finger the brush and the roller. Move the brush on the roller while turning the roller.
3. The electrical impulse.		
4. The magnets and chute blades.	12	Take a card, push it in up to the edges of the chute blades, press one of the hammers and continue pushing the card until it falls into a pocket. Extract the chute blades and examine the differences in their sizes.

Subject	Aid No.	Means of Determination
		Finger the teeth on the edges of the chute blades and feel the operation of the "magnets" on them.
5. Timing (machine cycle and card cycle).		
6. Reading a single column and simultaneous reading of the whole card (80 columns).		

LESSON NO. 5

UNIT RECORD MACHINE SYSTEM

1. General review of the following machines:-

Card Punch and Hand Card Punch 011 -	without control panel
Verifier -	" " "
Sorter -	" " "
Interpreter -	with control panel
Collator -	" " "
Reproducing Punch -	" " "
Calculating Punch -	" " "
Accounting Machine	" " "

2. The function of the control panel.

LESSON NO. 6

ORGANIZATIONAL SCHEME

Subject	Aid No.	Means of Determination
1. Examples of characteristic processings performed by the conventional system.		
2. Final output (interpreted card files and reports).	13	For partially sighted trainees: note the printing on the paper. For blind trainees: Note the continuity of the paper. Open the 'harmonica' and close it again.
3. The customary organizational structure of a conventional installation - programming unit, executive unit, liaison unit.		

Subject	Aid No.	Means of Determination
4. Methods of labeling and storing card files.	14	Finger the braille label on the box.
5. Methods of transporting card files.		

REVISION QUESTIONS

1. How does the machine read the punch?
2. What is the meaning of "machine cycle", "card cycle"?
3. What are the functions of each of the following machines?

   Punch, Hand Punch Oll, Verifier, Sorter, Interpreter, Collator, Reproducing Punch, Calculator, Tabulator.

4. What is the control panel wiring for?
5. What are the outputs of the installation?

LESSON NO. 7

THE IBM SORTER 083

1. The task of the Sorter:
   a) Arrangement of cards in ascending or descending order according to a specific field, numerical or alphabetical.
   b) Division of cards into groups.
2. Components of the machine:
   a) Feed hopper, file feed, automatic hinged joggle plate.
   b) Brush, brush holder, column selector knob.
   c) Roller.
   d) Scale of columns for the direction of the brush (column indicator on the brush-holder).
   e) Mechanism of transport of the cards (magnets, chute blades).
   f) Sorting pockets (13 sorting pockets, pocket stop lever).
   g) Counter.
   h) Keys and control lights.
3. Speed of the machine (comparison with 082 and 084).

LESSON NO. 8

PERFORMANCE OF THE SORTER

1. Sorting and collection according to one column:

   a) Direction of brush towards column and checking with the aid of standard cards (units and tens).

   b) Collection in ascending order.

   c) Collection in descending order.

2. Sorting according to a numerical field:

   a) In ascending order (e.g. arrangement of cards according to number of bank account).

   b) In descending order (e.g. arrangement of cards according to age (the year of birth as punched).

   c) Detailed explanation of why the order of the columns for sorting is from right to left.

LESSON NO. 9

PERFORMANCE OF THE SORTER (CONTINUED)

1. Sorting one field within another (e.g. arrangement of the cards according to age within country of origin).
2. Sorting of the combinations:
   a) Ascending sorting within descending order.
   b) Descending sorting within ascending order.
3. Block sorting:
   a) Explanation of the method.
   b) Advantages and disadvantages of the method. (Examples of cases in which it is advisable to use this method).
4. Separation (closing of pockets):
   a) Conserving the existing order.
   b) Without conserving the existing order.

REVISION QUESTIONS

1. What are the tasks of the Sorter?
2. What are the components of the Sorter?
3. What are the speeds of the Sorters (082, 083, 084)?
4. How is the brush adjusted, and how is the adjustment checked?
5. How are the cards collected from the pockets in ascending order?
6. Give an example of numerical sorting in descending order.
7. Give an example of sorting one field within another.
8. What is the purpose of sorting in blocks?
9. What are the advantages of closing the pockets?
10. What use is made of the counter?

LESSON NO. 10

(To be given individually)

IDENTIFICATION OF THE IBM 083 SORTER'S

COMPONENTS

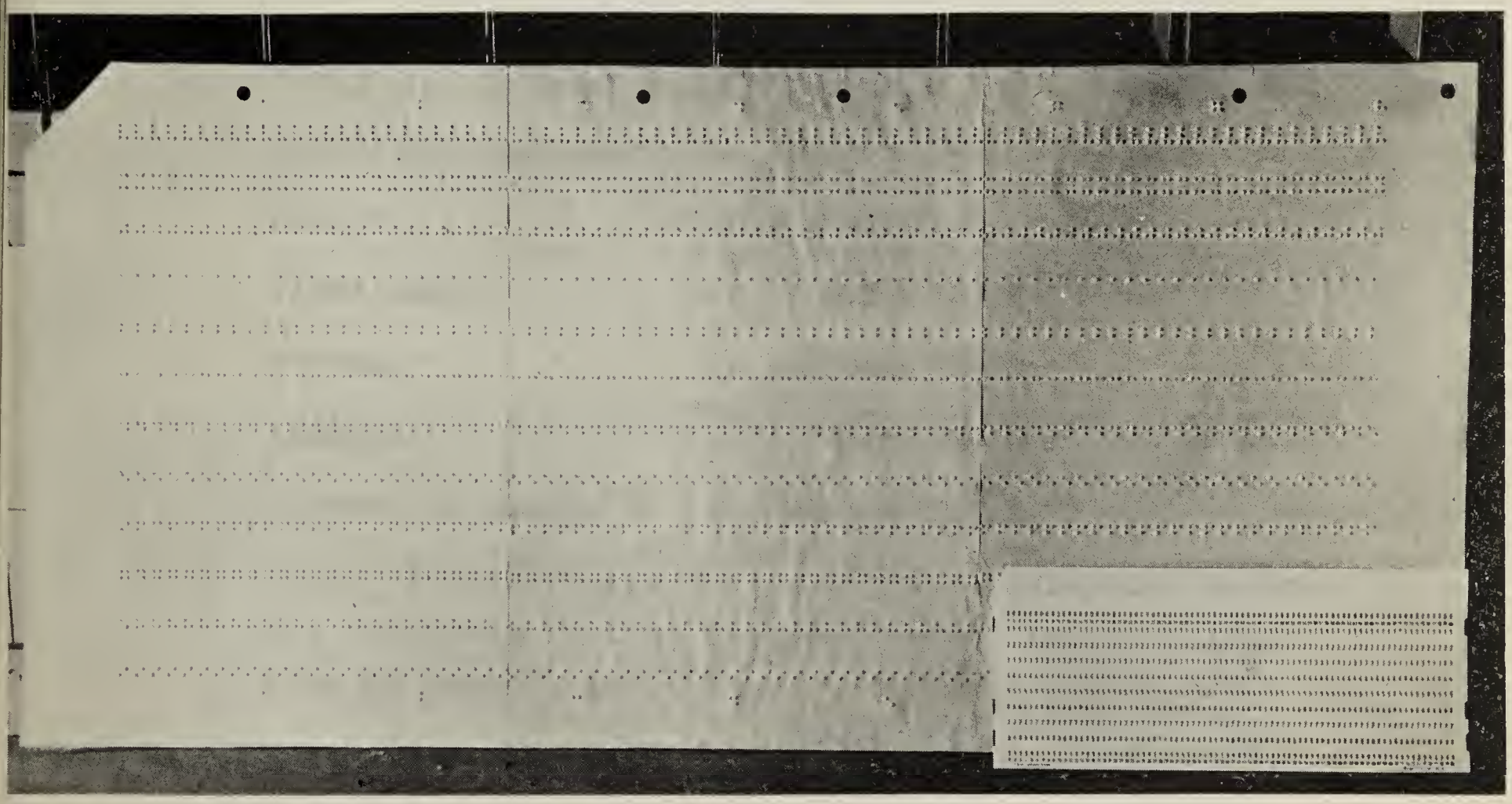
1. Feed Hopper
2. File Feed
3. Hinged Joggle Plate
4. Card Weight
5. Brush
6. Brush Holder
7. Column Selector Knob
8. Brush Gage
9. Contact Roller
10. Scale
11. Column Indicator
12. Magnets
13. Chute Blades
14. Pockets (13)
15. Pocket Jogglers
16. Pocket Stops
17. Control Lever for Adjusting Pocket Stops
18. Counter (Counter Switch and Zeroing Wheel)
19. Start Key
20. Stop Key
21. Digit Suppression Keys
22. Sort-Selection Knob
23. Numerical Sort - N
24. Zone Sort - Z
25. Alphabetical Sort - A1
26. Alphabetical Sort - A2
27. Alpha-Numerical Sort - AN
28. Edit Switch
29. Edit Stop Switch
30. Sort/Test Switch
31. Edit Control Light
32. Power Light
33. Main Switch

SPECIAL AIDS

N.B. All the aids are for the use of blind trainees, with the exception of those marked with an asterisk, which are for the use of partially sighted trainees.

1. Standard IBM card with upper left corner cut.

2. Card measuring 56 x 28cm., in braille, with upper left corner cut. All digits 0-9 as in Standard IBM card but in place of 11 and 12, X and V are given. The columns are marked in tens by the figures 1-8 at the top and at the bottom, as illustrated below.



3. A card without a cut corner; a card with the upper right corner cut; a fully coloured card*; a card with a coloured stripe*; a card containing specific information*.

4. Standard IBM carton containing five boxes of cards.

5. Standard IBM card punched in three columns: 5/1, X/17 and 9/75.

6. Standard IBM card containing the following punches: X/1, V/2, 0/10, 1/11, 2/12, 3/13 etc. ... 9/19, V5/31, X3/33, 02/35,

7. The following Standard IBM cards: units, tens, alphabetical.

8. Standard IBM card containing the following information:

   Identity card number, in columns 1-7

   Salary - in columns 8-13

   First name - in columns 14-19

   Surname - in columns 20-28

   Address - in columns 29-42

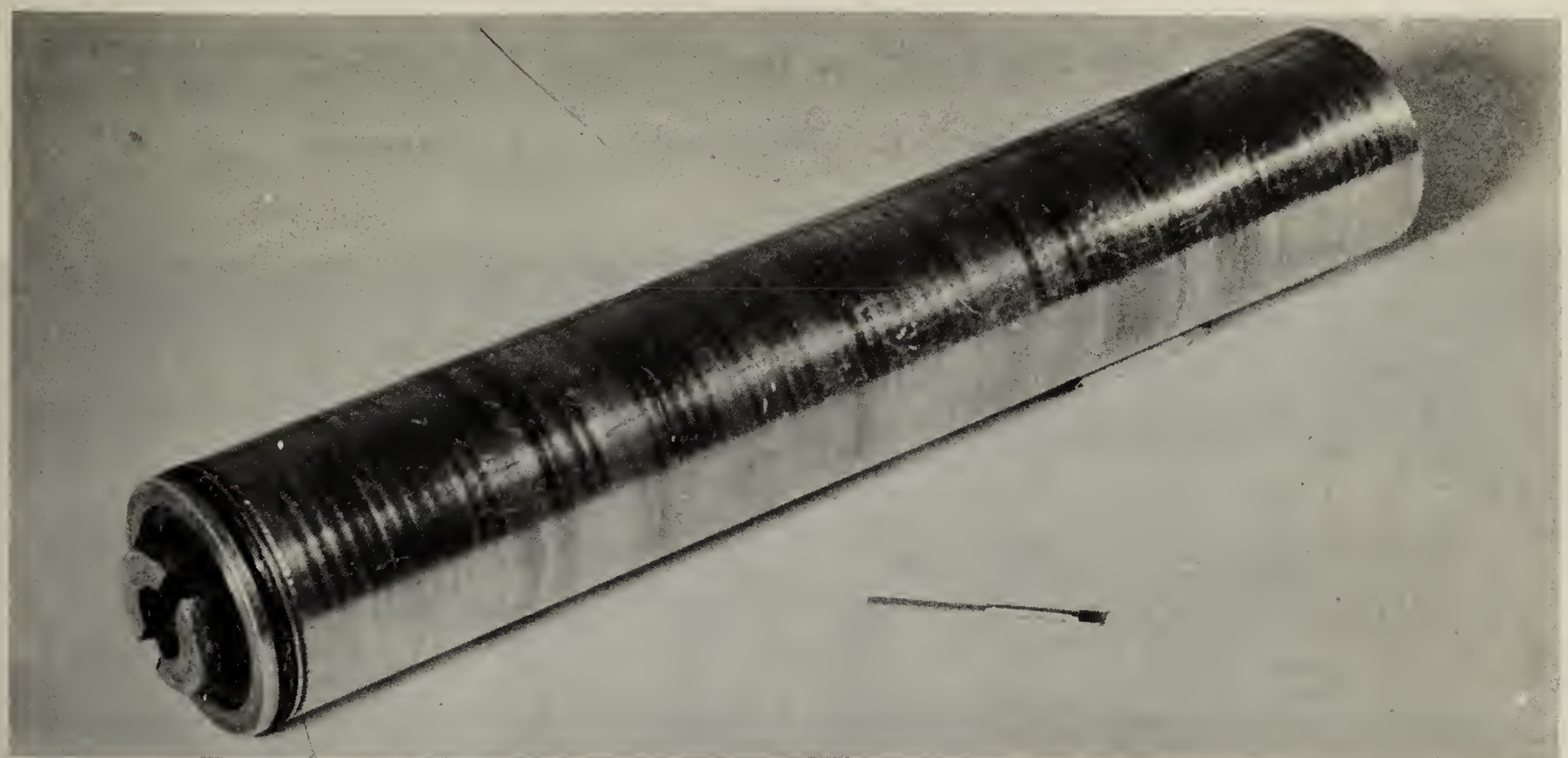
   Country of Origin - in columns 61-62

   Note: In order that the pupil can distinguish between the different fields, it is suggested that a raised line be drawn between them.

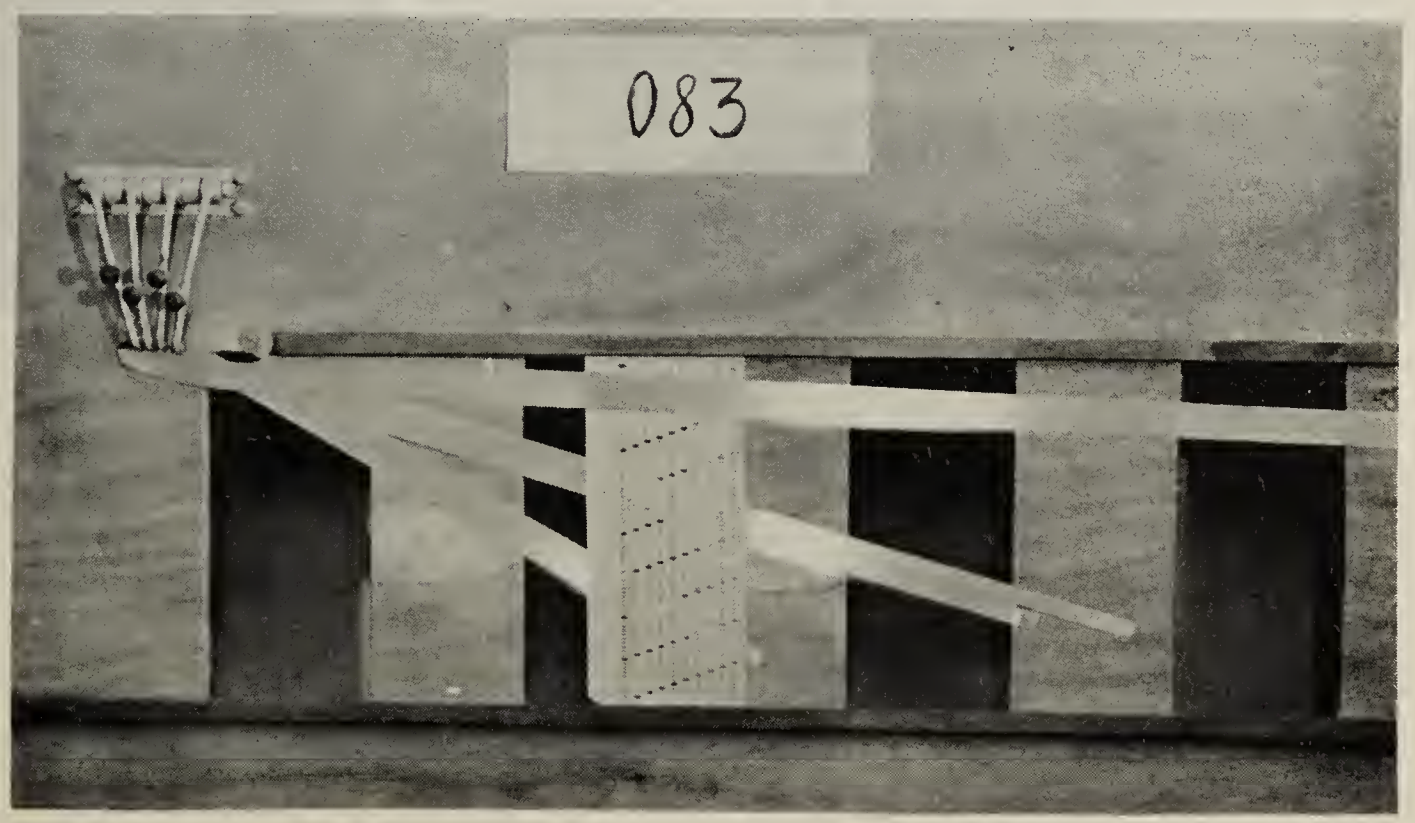
9. Standard IBM card with X punched in column 80.

10. Standard IBM card with end print containing date* and standard IBM card with end print with continuous number*.

11. Standard IBM brush and contact roller, as illustrated:



12. Wooden model of the Sorter, with original chute blades and hand-operable hammers in place of the magnets, as illustrated:



13. Continuous paper, used by the Tabulator*.

14. Standard box, identified in braille, as illustrated:

EXERCISES FOR OPERATION OF IBM SORTER 083

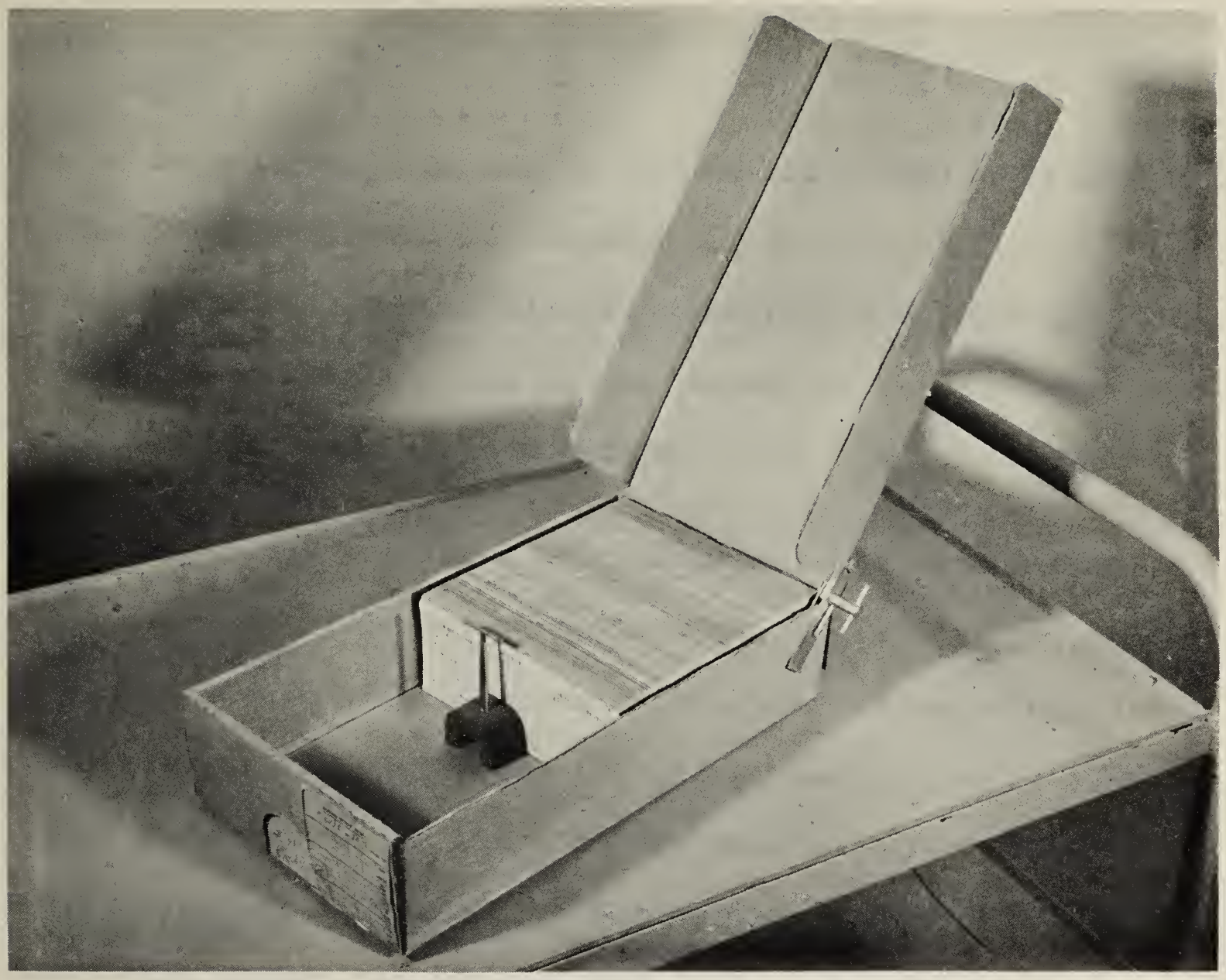
Analysis of the actions (job breakdown) involved in the operation of the Sorter (with file feed) showed that modification of these actions according to the capabilities of the blind enables the blind trainee to execute all kinds of sorting efficiently. Consequently the practical lessons have been formulated as described hereunder, and are designed to be given to the trainees in the machine-room by the practical instructor.

The lessons are constructed in the form of exercises, with no limitation on time, because the ability to grasp the performance of each action depends on the individual capabilities of each trainee.

The exercises embrace more material than the job breakdown presented in Report No. 1. They also include special aids, lacking in regular installations, which were specially designed for the improvement of work methods. Two of these aids, accessories for holding box cover and cards, are illustrated hereunder:

Accessories for holding box cover and cards.

What can happen without cover lock and card supporter.



Accessories in use.

Advantages of the above accessories:

Cover lock:

1. It can be affixed to any standard IBM box.
2. It is simple to operate.
3. The cover remains open in a vertical position, and thus:-
   a) Does not take up any space.
   b) Obviates danger of being damaged by passers-by.
   c) Prevents cover falling, with consequent loss of cards.

Magnet:

Acts through the box to the metallic cart. It prevents the cards from falling forward.

Note: If the cart is not metallic, a weight can replace the magnet, but as the magnet is relatively heavy it can also be used as a weight.

One of the questions which arose in the formulation of the method of instruction was whether, while sorting, the trainees should examine cards at the time of removing them from the pockets, or before inserting them to the Feed Hopper (in the event that at least two columns are to be sorted and only one check is made). During the research it was found that each method had its own particular advantages, which are set out hereunder:

Advantages of checking at the time of extraction from pockets:

1. There is a continuous check on the action of the brush; it is possible to detect any defect in the Sorter's operation in time.
2. Knowing from which pocket the cards were extracted assures insertion to the suitable card rack.
3. The operator is able to put all the cards from the card rack into the file feed.

Advantages of checking before inserting into the Feed Hopper:

1. Knowing from which card rack the cards were extracted assures insertion into the correct feed hopper.
2. When cards in which the punch is too high are discovered in a card rack the mistake can be corrected during the work without difficulty. (On checking at the time of extraction, a mistake of this nature can be discovered only when checking the order by the Collator; consequently all the sorting has to be repeated).
3. If cards in which the punch is too low are discovered the sorting is of no value, but there is no need to double-check all the following columns.

SUGGESTIONS

1. Should the card racks be divided into 3-4 secondary sections, each containing about 600 cards, a check before insertion into the feed hopper is advisable.
2. Generally, the size of the card file and the physical ability of the operator should be taken into consideration when decided the matter.
3. It is preferable to explain the advantages of both methods to the trainees, and to decide with each trainee individually what is the appropriate method for him.

For instance:

a) the operator is unable to raise all the cards in the card rack to the feed hopper;

b) the operator may be partially-sighted and have to strain his eyes in order to see whether the pockets are filling; he may thus overlook a pocket that has already filled up. In such a case it may happen that several pockets become full simultaneously and the continuous action of the machine is thereby interrupted.

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27

EXERCISE NO. 1
(IBM SORTER 083)
BRUSH ADJUSTMENT

No.	Left Hand	No.	Right Hand
1	Place on magnet's upper cover	1	Place on file feed
2	Support magnet's upper cover	2	Support file feed
3	Pull open magnet's upper cover	3	Pull open file feed to the right
4	Place on brush holder	4	Place on column selector knob
5	Hold brush holder	5	Hold column selector knob
6	Push locking key 90° to the left with thumb	6	Turn column selector knob 1/6 turn to the left
7	Take out brush holder	7	Idle
8	Transfer brush holder to right hand by turning it 180° vertically	8	Receive brush holder from left hand
9	Place on brush clamp nut } To prevent	9	Hold brush holder (hold head of brush with finger and thumb)
10	Open brush clamp nut } damage to	10	Pull up the brush approx. 5mm.
11	Close brush clamp nut } brush	11	Hold brush holder
12	Place on brush gage	12	Transfer brush holder to brush gage
13	Help arrange brush holder on brush gage	13	Arrange brush holder on brush gage
14	Open brush clamp nut	14	Hold brush holder on brush gage (finger on brush head)
15	Hold brush clamp nut	15	Press on brush head with finger which connects with brush gage
16	Close brush clamp nut	16	Hold brush holder
17	Receive brush holder from right hand	17	Transfer brush holder to left hand by turning brush 90° towards operator
18	Hold brush holder	18	Close brush clamp nut tightly
19	Hold brush holder	19	Run a finger along the plate of the brush from center to the edge of the brush (to feel if the edge of the brush is at the same level)
20	Turn brush holder 90° downward	20	Place on column indicator (for orientation)
21	Open locking key 90° with thumb	21	Place on brush holder mount (vertically down from the column indicator
22	Transfer brush holder to its mount	22	Place on column selector knob
23	Adjust brush holder on its mount	23	Hold column selector knob
24	Push down locking key with thumb	24	Turn column selector knob 1/6 turn to the right
25	Place on magnet's upper cover	25	Place on file feed lock handle
26	Support magnet's upper cover	26	Hold file feed lock handle
27	Pull magnet's upper cover closed	27	Pull file feed lock handle closed

No.
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6
7

ALTE
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2
3
4
5
6

NOTE

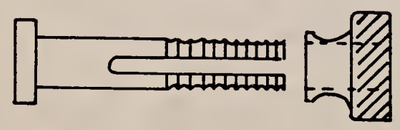
EXERCISE NO. 2

(IBM SORTER 083)

BRUSH REPAIR

No.	Left Hand	No.	Right Hand
1	Hold brush holder	1	Open clamp nut slightly
2	Hold brush holder	2	Grasp head of brush and pull brush out
3	Hold brush holder	3	Take new brush
4	Hold brush holder	4	Insert new brush into the hole in brush holder until it connects with the screw
5	Turn screw until brush enters slot in screw	5	Push brush down until it enters the slot in screw
6	Hold brush holder	6	Continue pushing until brush enters into second hole in brush holder
7	Hold brush holder	7	Tighten clamp nut
	ALTERNATIVE METHOD		
1	Grasp head of screw between thumb and forefinger	1	Remove clamp nut and put it in a convenient place
2	Remove screw from brush holder	2	Remove brush
3	Hold brush holder	3	Take new brush
4	Hold brush holder	4	Insert brush into both holes in brush holder
5	Replace screw in brush holder, turning it until the slot fits over the brush	5	Hold brush holder
6	Hold brush holder	6	Replace and tighten clamp nut

NOTE: The standard screw has been replaced by a special screw, as illustrated.



No.	
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3	Pul
4	Tra
5	Tra
6	Rea
7	As

1	Pla
2	Tur

No1

EXERCISE NO. 3

(IBM SORTER 083)

BRUSH ADJUSTING

No.	Left Hand
1	Place on finger lever of brush holder
2	Hold finger lever of brush holder
3	Pull finger lever of brush holder
4	Transfer finger lever of brush holder
5	Transfer the column indicator to the place the finger indicates
6	Read (with finger) on what column the indicator is set
7	As 6

No.	Right Hand
1	Place on selector knob
2	Hold selector knob
3	Turn selector knob 1/6 turn to the left
4	Place on Braille scale **(see illustration)**
5	Read the chosen column with the finger
6	Place on the column selector knob
7	Turn the column selector knob 1/6 turn to the right

EXERCISE NO. 4

(IBM SORTER 083)

COUNTER RESETTING

1 Place thumb on the counter reset key

2 Turn the counter reset key downward (the operator will feel and hear loud clicks until two very close together soft clicks will be heard; after them the counter reset key will become stiffer.

Note: There is a maximum of 10 turns, so it can be repeated.

EXERCISE NO. 5
IBM SORTER 083

CHECKING AND RESETTING OF MACHINE AND KEYS

1 Push sort/test switch away from operator

2 Press the digit-suppression keys upwards from right to left with thumb, to open

3 Run finger tip from left to right to check if keys are level

4 Hold the sort selection switch

5 Turn it to the right until it stops (to N)

6 Take standard checking cards (one of tens and one of units)

7 Open hinged joggle plate

8 Take out card weight

9 Place checking cards face down, first column toward operator

10 Arrange the cards in the feed hopper

11 Put the card weight back in the feed hopper

12 Close the hinged joggle plate

13 Push start key (wait until it stops automatically)

14 Pass left hand from 9th pocket to the right

15 Take out the first card

16 Read in what pocket it fell (there is a braille sign in every pocket)

17 Check whether it is the tens or units card (the trainee can feel the difference between them)

18 Pass right hand to the left from reject pocket

19 Take out second card

20 Read in what pocket it fell

21 Compare the sum of the cards (tens and units) with the position at which the column indicator is set

Note: The sum must be the same as shown on the indicator.
If it is not, there are two possibilities:

1) The brush is damaged or not adjusted.
2) The sorter has a mechanical defect.

EXERCISE NO. 6

(IBM SORTER 083)

BOX-SIGNING

SPECIAL AID: Standard IBM Card signed in Braille in the centre 2-3cm. from the bottom.
No. 14 (P.32)

METHOD A:

Hold card with signature facing outward and slide it into place between end of box and window so that signature can be read through window.

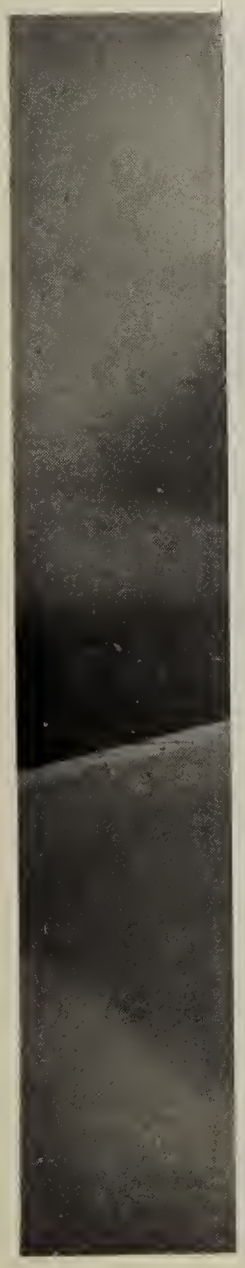
METHOD B:

1. Make room for opening the box.
2. Open box cover.
3. Open end of box by pushing end with finger through window.
4. Place the signed card in front section with the Braille signature behind window.
5. Replace edge.
6. Read the signature.

NOTE: If the signing is temporary it is best to place a Standard IBM card signed in Braille on top of the other cards or in front of them.

SPECIAL A

1	Assis
2	Place
3	Hold
4	Open
5	Hold
6	Place
7	Take
8	Put m



EXERCISE NO. 7

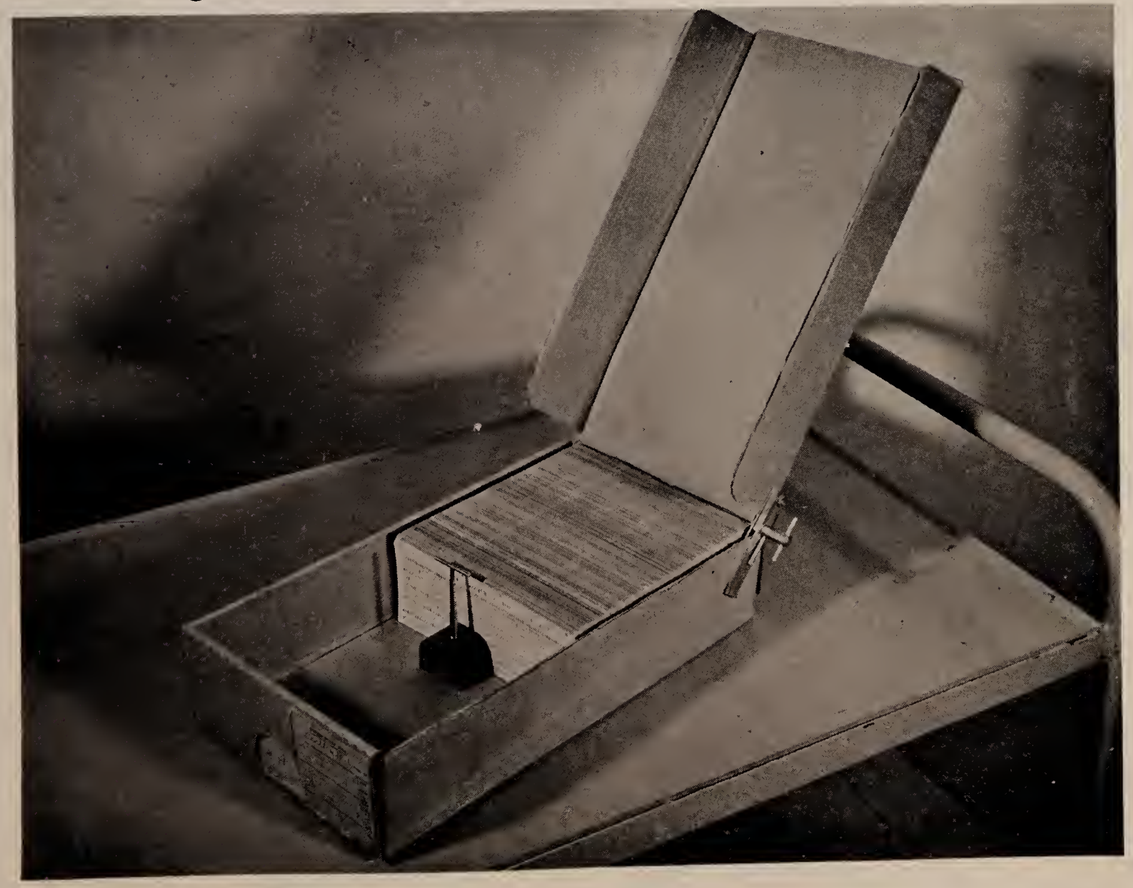
(IBM SORTER 083)

ARRANGEMENT OF CARRIAGE AND MATERIAL FOR MACHINE FEEDING

SPECIAL AIDS: 1. Magnet

2. Instrument for holding box cover 90° open.

LEFT HAND	RIGHT HAND
1 Assists with precising.	1 Place carriage with boxes facing operator.
2 Place on box cover.	2 Place Aid No. 2 on right back corner of box.
3 Hold box cover.	3 Push instrument over right edge of box, one leg outside and one between cover and side of box.
4 Open box cover.	4 Hold the instrument key.
5 Hold box cover.	5 Turn instrument key 180°.
6 Place on magnet.	6 Place on first cards in the box (approximately 5cm. deep).
7 Take magnet.	7 Take first cards out of box.
8 Put magnet in the place of the cards taken out.	8 Convey the first cards to the feed hopper.



1 He
2 Pl
3 Pu
4 Id
5 Id
6 Id
7 Id
8 Id
9 Id
10 Pu
11 Id

EXERCISE NO. 8

(IBM SORTER 083)

FEEDING CARDS FROM A BOX OR FROM A CARD RACK

1 Helps to hold the group of cards.	1 Take a group of cards from a box or from a card rack.
2 Place on start key.	2 Transfer the group of cards to the feed hopper.
3 Push start key (wait until it stops automatically).	3 Put the group of cards in the feed hopper.
4 Idle.	4 Knock on the side of the cards once or twice to straighten them.
5 Idle.	5 Place on hinged joggle plate.
6 Idle.	6 Open hinged joggle plate.
7 Idle.	7 Grasp the card weight (at the bottom of the feed hopper).
8 Idle.	8 Take out the card weight.
9 Idle.	9 Arrange the first cards in the feed hopper.
10 Push start key.	10 Close the hinged joggle plate.
11 Idle.	11 Place card weight on the cards in the feed hopper.

EXERCISE NO. 9

(IBM SORTER 083)

TAKING CARDS OUT OF A POCKET, CHECKING AND INSERTING IN THE FEED HOPPER OR IN A CARD RACK

No.	Left Hand	No.	Right Hand
1	Place on pocket joggler	1	Place on stop key
2	Pull pocket joggler open	2	Press stop key
3	Place on Braille number in the pocket	3	Place on a full pocket
4	Read the Braille number **(See illustration Exercise 10)**	4	Push cards down (making room for exit)
5	Close pocket joggler	5	Transfer cards to card checking instrument
6	Knock on the left side of the cards 2-3 times to straighten them	6	Hold the group of cards
7	Hold the group of cards	7	Knock on the top of the cards 2-3 times
8	Hold the group of cards	8	Push the selected needle
9	Take out the cards	9	Help take out the cards
10	Transfer the cards to feed hopper or to a card rack	10	Help transfer the cards (if to the card rack read the Braille number in the card rack)

Note: 1. The instrument has to be adjusted at the same column as the brush.

2. On this job the tasks of the different hands can be interchanged, depending on the place of the full pocket, the punches which are to be checked and the comfort of the operator.

3. If the needle does not enter completely, it is easy to find the card with the error.

EXERCISE NO. 10

(IBM SORTER 083)

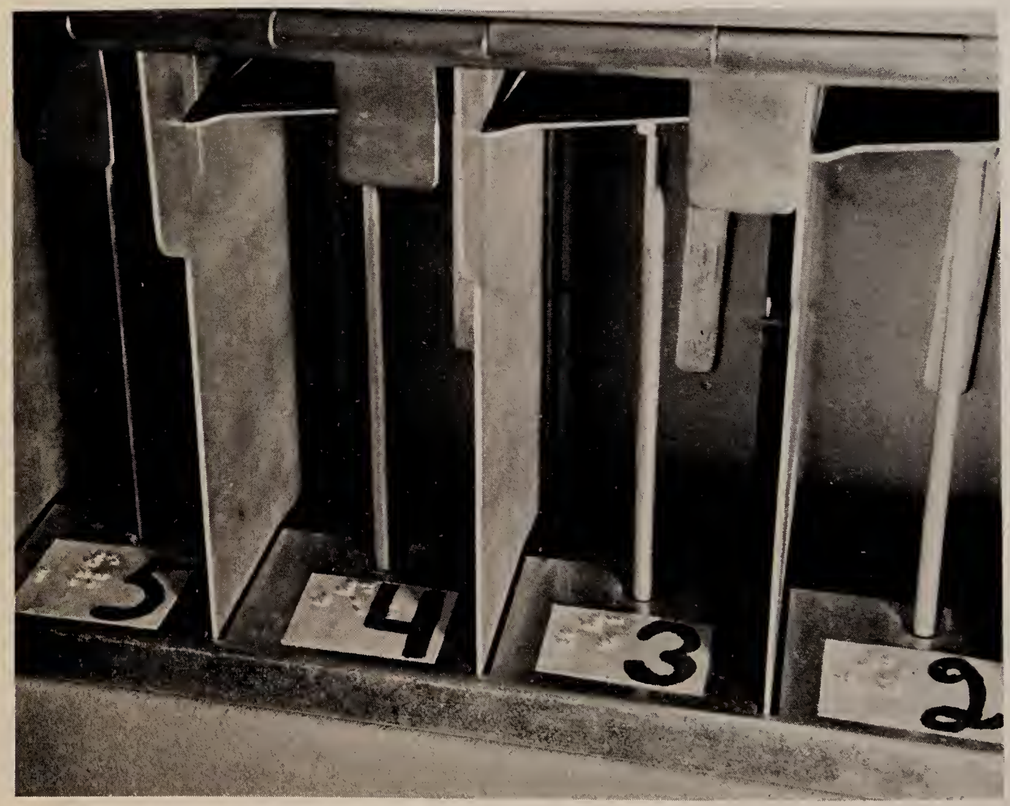
TAKING CARDS OUT OF TWO FULL POCKETS AND PUTTING THEM PARALLEL ON UPPER MACHINE'S COVER OR INTO 2 CARD RACKS

No.	Left Hand
1	Idle
2	Idle
3	Place on left full pocket
4	Read the Braille number in the pocket
5	Push cards downward (making room for exit)
6	Transfer the cards parallel to upper machine s cover or into 2 card racks
7	Place on the pocket joggler
8	Close the pocket joggler

Note: 1. This job is suitable for when the cards are checked before feeding.

2. On this job, the tasks of the different hands can be changed, depending on the place of the full pocket and the operator's comfort.

No.	Right Hand
1	Place on pocket joggler
2	Pull pocket joggler open
3	Place on right full pocket
4	Read the Braille number in the pocket
5	Push cards downward (making room for exit)
6	Transfer cards parallel to upper machine's cover or into 2 card racks
7	Place on the start key
8	Push the start key



EXERCISE NO. 11

(IBM SORTER 083)

TAKING CARDS OUT OF A POCKET AND INSERTING IN A BOX

No.	Left Hand	No.	Right Hand
1	Place on pocket joggler	1	Place on stop key
2	Pull pocket joggler open	2	Press stop key
3	Place on Braille number in the pocket	3	Place on a full pocket
4	Read the Braille number	4	Push cards down (making room for exit)
5	Close pocket joggler	5	Convey cards to card checking instrument
6	Knock on the left side of the cards 2-3 times to straighten them	6	Hold the group of cards
7	Hold the group of cards	7	Knock on the top of the cards 2-3 times
8	Hold the group of cards	8	Push the selected needle
9	Take out the cards	9	Help take out the cards
10	Transfer the cards to feed hopper or to a card rack	10	Help transfer the cards (if to the card rack read the Braille number in the card rack)
11	Place on the box	11	Transfer cards to box
12	Pull forward the cards which are in the box (if any) to make room for new ones	12	Put cards into the box
13	Press the cards on all sides to ease covering	13	Press the cards on all sides to ease covering
14	Place on box cover	14	Place on box cover
15	Pull box cover	15	Pull box cover
16	Close the box by putting the sides of the cover into the box	16	Close the box by putting the sides of the cover into the box
17	Knock on the box to close it tightly	17	Knock on the box to close it tightly

Note:
1) The instrument has to be adjusted at the same column as the brush.
2) On this job the tasks of the different hands can be interchanged, depending on the place of the full pocket, the punches which are to be checked and the comfort of the operator.
3) If the needle does not enter completely, it is easy to find the card with the error.

EXERCISE NO. 12

REMOVING JAMMED CARDS

1. Open machine's upper cover, supporting it to prevent closing.
2. Pass hand from left to right as far as the reject pocket to check whether there are any jammed cards between the rollers. Should a jammed card be found, it must be removed to the left.
3. Close machine's upper cover.
4. Push file feed to the right
5. Open magnets' cover.
6. Open magnets' lock with the index finger of the left hand.
7. Open magnets' unit with the right hand.
8. Pass hand from left to right as far as the contact roller to check whether there are any jammed cards between the rollers.
9. If a jammed card is near the contact roller, remove the brush holder to prevent damage to the brush.
10. Remove cards from the feed hopper.
11. Check whetner there is a card between the feed hopper and the roller, using right hand.
12. If a jammed card is in the feed hopper, switch off main switch, open the right machine cover and pull the belt of the motor upwards to ease removal of the card.

13. Replace brush holder.

14. Close magnets' unit.

15. Close magnets' cover.

16. Pull file feed towards the left.

NOTE: Should the jammed card be near the brush, it is preferable to check the brush with checking cards.

PRACTICAL WORK ON THE SORTER
(SORTING EXERCISES)

The following exercises cover the main work on Sorter 083. The practical work is incorporated in the exercises for operating the Sorter and studying its components and accessories, and their handling.

The number of times each trainee will have to repeat these exercises will depend on his individual ability, as well as the level of skill that the management of the course will require from graduates.

Sorting	No. of Columns	No. of Boxes
Numerical sorting with supervised exercises	1	2
Numerical sorting - independent work	6	2
Numerical sorting - independent work	6	10
Sorting numerical field within numerical field	6 & 4	10
Alphabetical sorting	10	6
Alphabetical sorting	10	10
Descending numerical sorting	6	3

Sorting	No. of Columns	No. of Boxes
Descending numerical sorting	6	10
Ascending field within descending field	6 & 4	3
Dividing a large card file into batches (numerical data)	6	20
Advantage: Handling smaller quantities of cards.		
Disadvantage: Packaging.		
Alphanumerical field	10	10
Sorting by date (month) - Sorting from left to right instead of right to left.	6	20
(If the month is punched in 2 columns, ordinary units are first). To separate January from November, and February from December, the cards that entered pockets 1 and 2 have to be run again.		

NOTE: In each exercise that cannot be concluded in one run because of the large quantity of cards, the cards have to be stored in an appropriate way for the completion of the work on the following day.

GENERAL INSTRUCTIONS

(Should be transcribed into braille for each trainee)

1. Before starting to work check the following:-

   a) Whether the keys are in the desired position for the programme of work.

   b) Whether the brush is properly directed (this can be done with the aid of test cards).

2. If it is desired to extract cards from a pocket, the machine must be stopped first. It must not be switched on again before the cards are all out.

3. The card weight creates pressure on the Feed Hopper in order to enable all the cards to enter the machine, therefore:

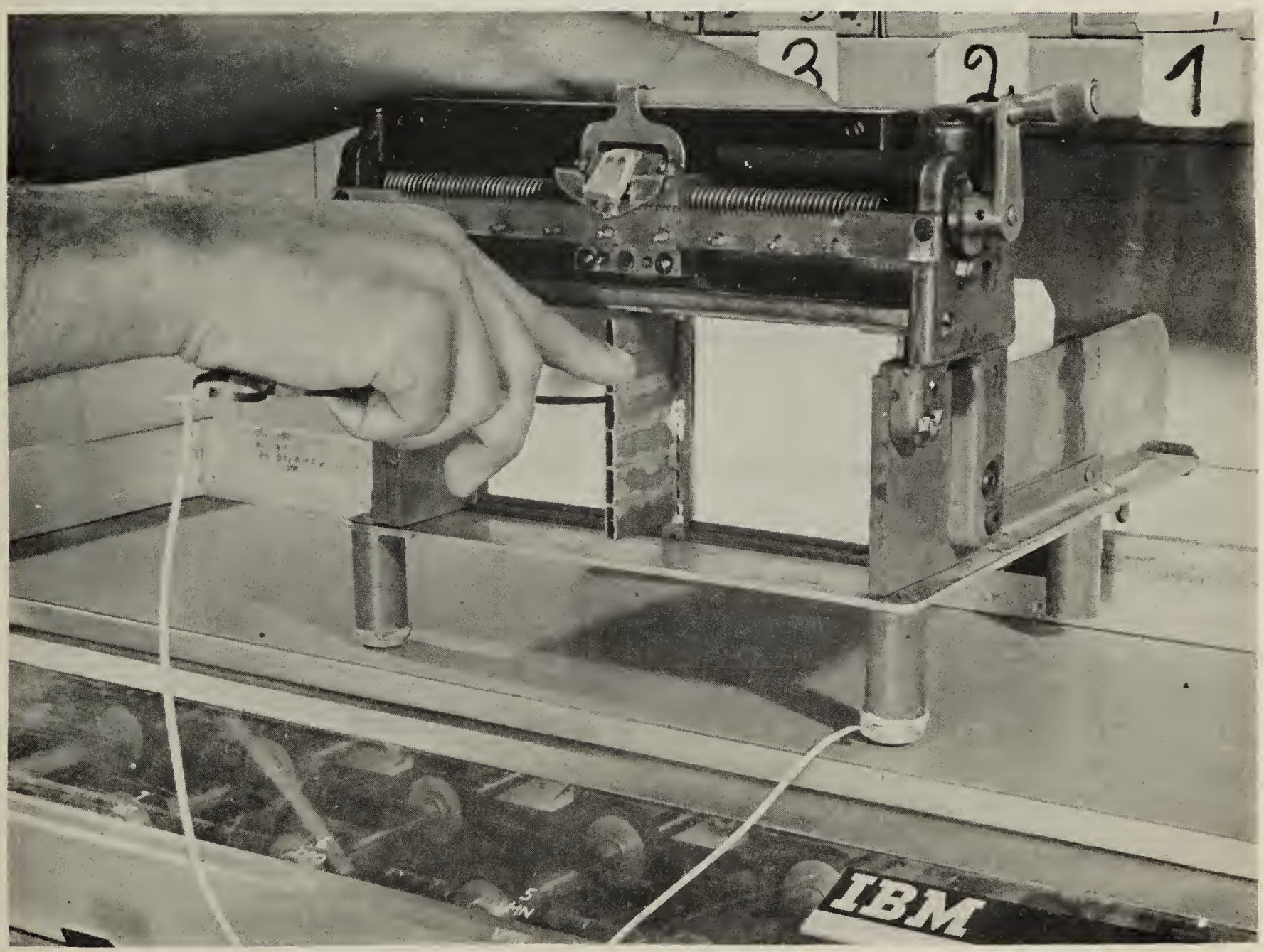
   a) Be sure that the card weight is in the Feed Hopper whenever the work is about to be completed.

   b) While the work is in process (when the Feed Hopper is full of cards) the card weight must be placed in its special pocket in the side of the machine.

4. When placing the cards in the carton leave a gap of about 1cm. between the carton and the card file to permit easy closing of the lid as well as easy extraction of the cards from the carton.

DEVELOPMENT OF CARD-CHECKING INSTRUMENT

The following is a description of the various stages of development of an instrument designed for checking cards in sorting. As mentioned in the chapter describing the job-breakdown of the work of a Sorter 083 operator, this instrument is essential to the blind operator as it frees him from dependency on a sighted one.

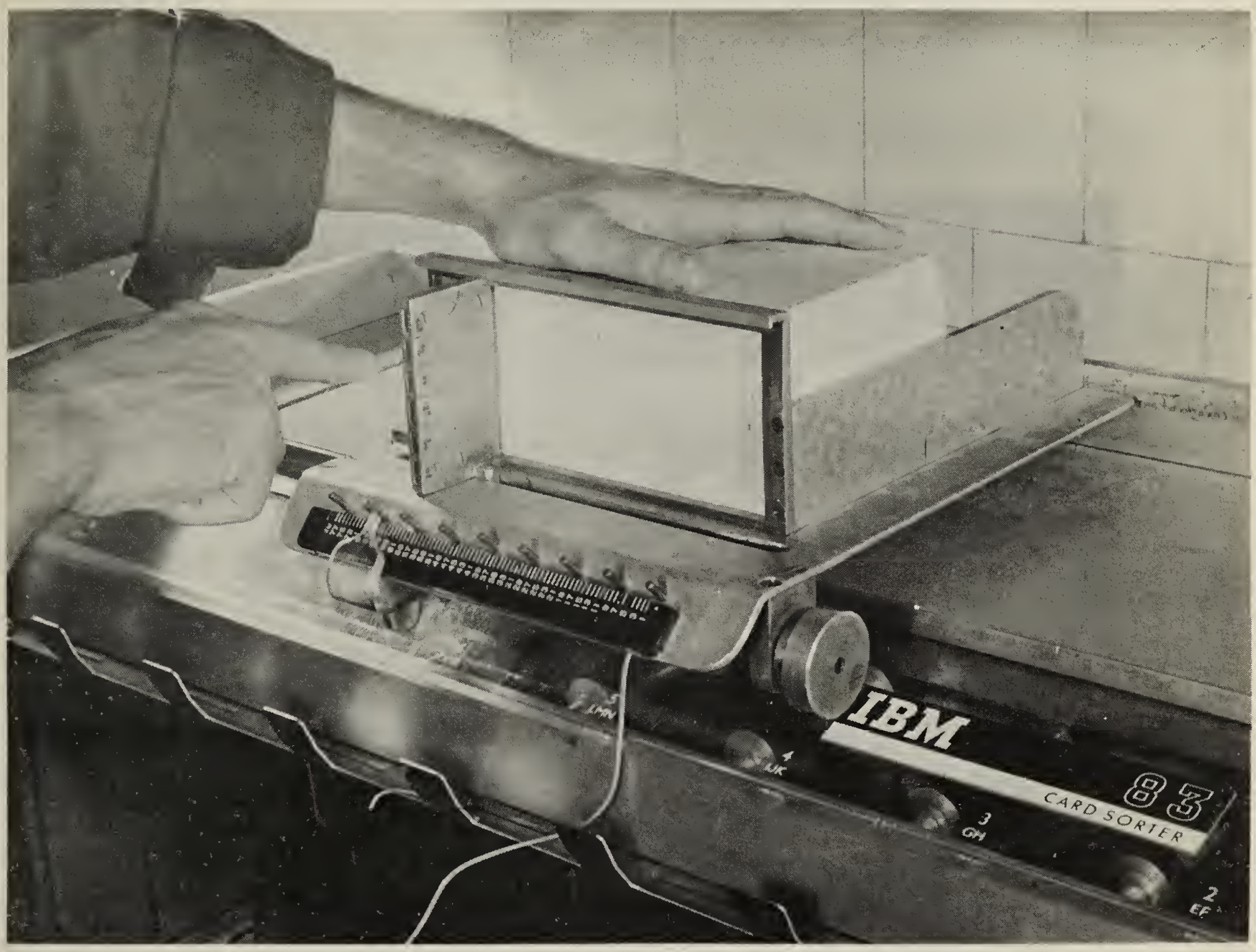


Picture No. 1

Picture No. 1 illustrates the first instrument built in Israel, which consists of standard components of IBM Sorter 082. This instrument enables the blind to operate the Sorter, but it has some disadvantages, as follows:-

1. A full turn of the handle moves the block over one column only.
2. In order to move the block over to a particular column the operator must count the number of turns, or clicks, starting from one of the tens columns - 10, 20, 30 etc.
3. All the parts of the instrument are exposed, thus they are not shielded from dust etc., and accordingly the operator's hands become soiled.
4. The instrument is very tall, thus placing strain on the hand that supports the cards.
5. The cards have no support at the back, and if they are not supported by hand they may fall behind the machine.
6. In order to insert the checking needle, the operator has to find the required hole in the block by counting the number of tracks between every two rows, 4-5, 6-7, 8-9 etc.
7. As the needle is suspended, the operator must first search for it along the wire and then hold it in such a way that it can be inserted into the required hole.

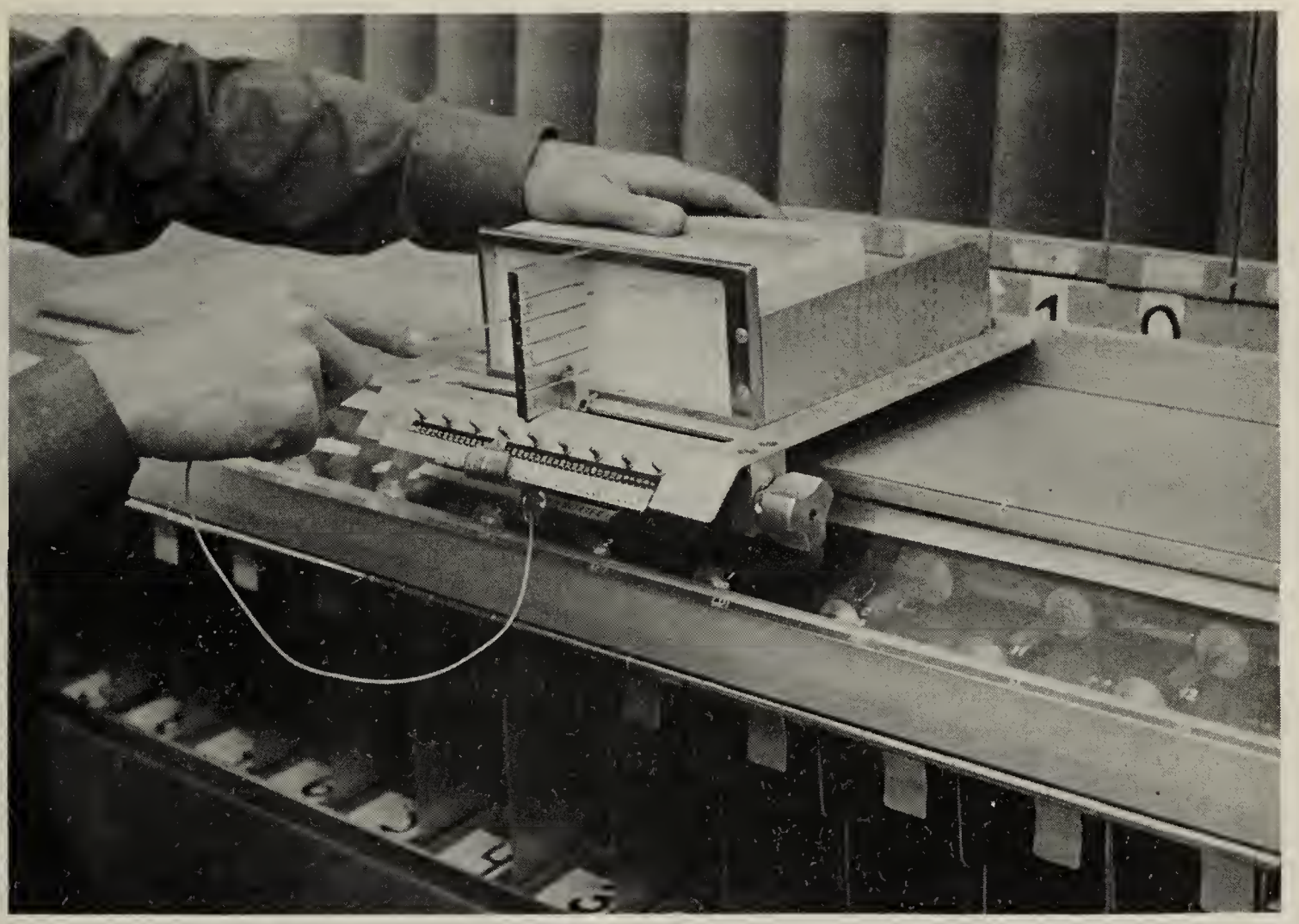
8. At the end of this operation the operator must pull the needle out, otherwise an incautious touch may damage it.
9. Sometimes the needle falls off the wire and has then to be sought and retied to the wire.



Picture No. 2

The above instrument represents an advanced stage in the development of a tool for checking cards in sorting. This instrument, like the first model, comprises standard components of Sorter 082.

In the design of this instrument we overcame the 3rd, 4th and 5th, and partially the 6th, disadvantages as described above (viz: instead of counting the holes, a braille sign indicates each pair of rows). The other disadvantages remained.

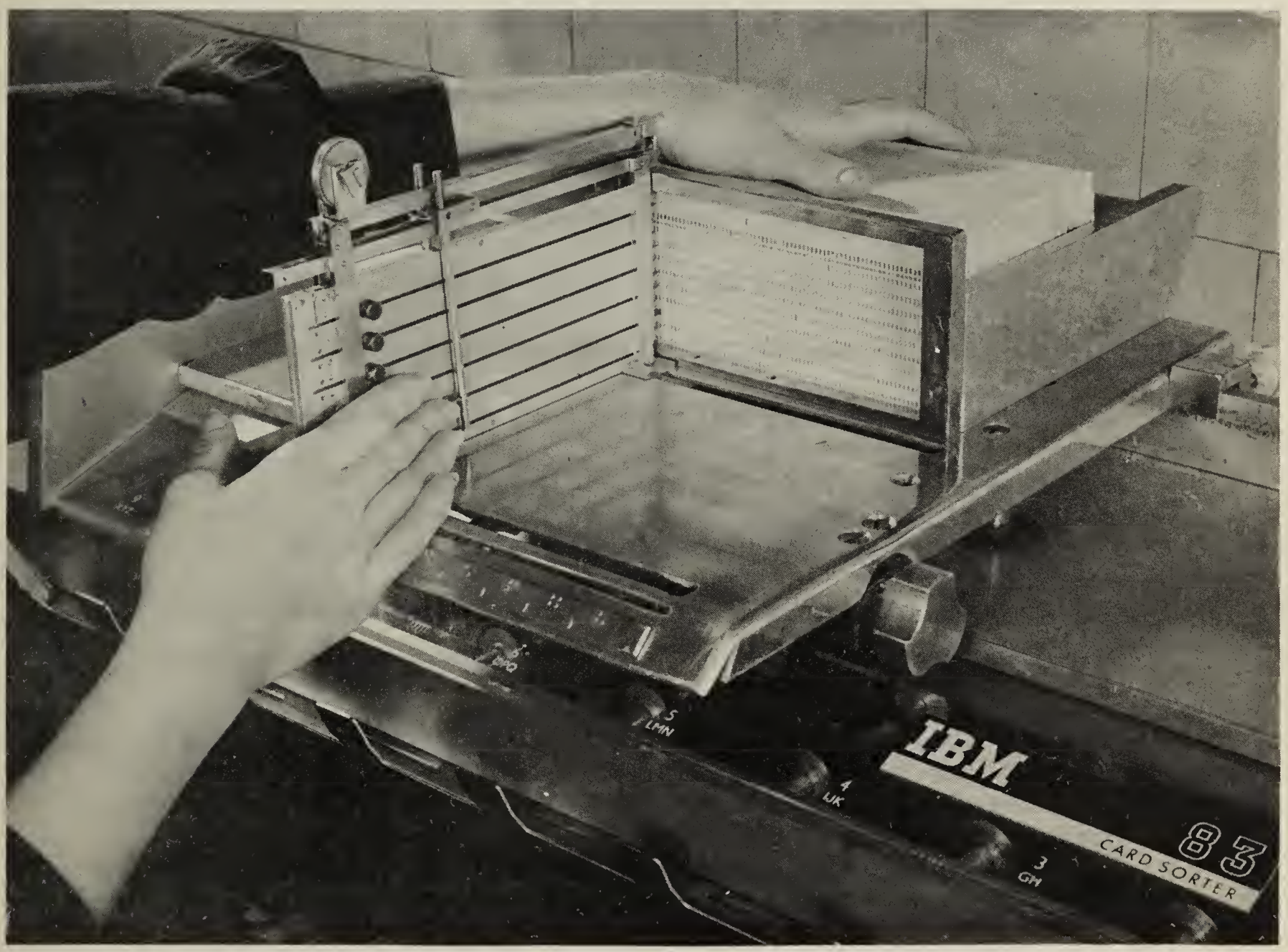


Picture No. 3

The instrument illustrated here consists of standard components of Sorter 083. By changing the components of

the instrument the first disadvantage of the previous two instruments was overcome. In this instrument only a one-third turn of the handle is needed for moving the block over one column.

With the aid of a braille ruler fixed to the instrument the operator can distinguish the required hole and thus overcome part of the 2nd disadvantage as well. However, due to technical reasons, this aid could not be utilized fully.



Picture No. 4

The instrument illustrated above is the final mechanical version.* None of the disadvantages relating to the previous instruments exists in this one, and in addition the following advantages were added:-

1. The block holding the needles is supported by two units, thus being more stable.
2. In the event of the operator forgetting from which pocket he has drawn the cards, he can ascertain this by pushing a number of needles into the batch of cards until one penetrates.
3. The instrument can be properly directed to the tens and fifths columns. From these points the block is moved forward by the column selector knob, column by column.
4. The cards may be checked by placing them in the instrument facing forwards with digit 9 to the bottom. This manner of checking saves a considerable amount of micro motions by the operator.

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*Since preparation of this report an electronic instrument for card-checking has been designed and is now being built. With this instrument it is expected that the blind will be able to perform the work at a very high speed. It should therefore be of benefit to a sighted operator as well while working on the sorter.

MEMORANDUM ON THE FUTURE DEVELOPMENT OF THE RESEARCH AND DEMONSTRATION PROJECT ON REHABILITATION OF BLIND, PARTIALLY SIGHTED AND OTHERWISE HANDICAPPED, BY WORKING IN THE PUNCH-CARD MACHINE SYSTEM*

By D. Chevion and Y. Schiff

1. DESCRIPTION OF THE PRESENT SITUATION

a. The second course for training blind to operate IBM machines is expected to end in March 1965. Ten trainees are participating in the course, four of them totally blind, four partially sighted, one with heart disease (specially recommended by Dr I. Kellerman, of the project for Rehabilitation of Cardiac Cases), and one a post-C.P. case (the last two are sighted).

b. The teaching programme of the second course was somewhat expanded in comparison to the first course. It included additional subjects: new models such as Sorter 083, Collator 88, and control panel wiring for the Accounting Machine 407.

c. The achievements of the second course are low in comparison to the first, in spite of the high level of training methods, greater skillof the instructors and more elaborate training aids acquired through the great advance in research. We are now conducting a psycho-sociological research in order to determine the reasons for these low achievements, which we assume are as follows:-

   i) The trainees are very heterogenous in regard to their respective capabilities, educational background and social conditions.

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*Prepared for a meeting of the personnel and others cooperating on the project.

ii) The mean level of the mental ability and personal characteristics such as stability, resoluteness, persistence and precision, of the class is low.

Nevertheless we expect that the course will provide at least 4-5 blind and 1 sighted handicapped operators and control panel wirers whose skill will not fall below that of the first course graduates.

d. In the light of recent developments and changes in automatic data processing in the world, and mainly in consideration of anticipated developments in this field, we decided to expand the scope of the original programme in both research and training. Accordingly in addition to training courses in conventional IBM machines, a programming course for the IBM 1401 Computer was arranged.

e. Another five blind trainees participated in the programming course, of whom two are graduates of the Hebrew University (with B.A. degree) and three have almost completed high school education.

f. The course began approximately three months ago, and is being conducted by the best available instructors in programming.

g. The original intention was to bring the trainees up to the level of sighted junior programmers. According to our assessment, achievement of this level requires twice as many study hours as are needed by sighted trainees. It is difficult to decide at present whether

this estimate is realistic, for several reasons: We have not yet acquired sufficient experience in teaching blind programmers; the most suitable training methods (including means of demonstration) have not yet been developed; the class is not sufficiently representative - to a large extent it has been composed hapharzadly.

h. All the trainees work during the day and accordingly have to study in the evenings. It may be that this fact, too, has an adverse effect on the achievements of the group.

i. One of the graduates of the first course, who is an operator in Bank Leumi, participated, experimentally, in a regular computer programming course established by the IBM Company for sighted people. A member of our research staff was attached to him for the whole period of the course in order both to assist him and to study the methods of training and their applicability to the blind. The results of this experiment are very encouraging. In the examinations the trainee reached an above-average level, due to his personal aptitude on one hand, and the assistance of the research worker on the other. However, this instance cannot constitute a true example for the ordinary blind operator as the aptitudes of the person involved are above average.

2. <u>THE ANTICIPATED DEVELOPMENT OF DATA PROCESSING IN ISRAEL</u>

a. It is possible that the larger IBM installations will be replaced, either partially or wholly, by electronic computers.

b. Nevertheless the age of conventional machines has not yet passed, since conventional machines will continue to exist in smaller enterprises.

c. Manpower requirements for the operation of conventional machines will definitely increase, along with the increase in manpower requirements for computer operation and programming.

d. Our research project is not conducted for Israel only but for developing countries all over the world. Thus the anticipated developments pointed out above are not the sole factors that determine the future of our research and training centre.

e. In our opinion there is a place for the continuance of training conventional machine operators. However, the permanent transition of conventional installations to mixed installations of conventional machines and electronic computers must be taken into consideration.

f. The prospective development of data-processing in Israel as noted above must be taken into consideration when selecting candidates for the following courses, and in the determination of the number of trainees in each course.

The Information Processing Association of Israel is at present conducting a census of manpower occupied in the field of Data processing. The census also shows that many operators will be needed in the near future. Some of these can be recruited from among the blind and otherwise handicapped.

3. FUTURE COURSES

a. As graduates must reach the highest level of achievements of conventional machine operators, including control panel wiring (and at least the level of the first course graduates who are working satisfactorily in various installations) the future candidates will have to pass tests equivalent to those given to sighted operators. Further, ability and educational requirements have to be higher than those required from sighted candidates of parallel courses.

b. The number of trainees per class must be limited to five in order to ensure:-

   i) Intensification of training and research.
   ii) Proper placement and adjustment in installations.

c. The programme of studies in the third course will be more flexible and more inclusive. All the trainees, without distinction, will be given three stages of training in the following:

   i) Conventional machine operation.
   ii) Control panel wiring for conventional machines.
   iii) Programming for electronic computers.

   Thus each candidate must be suitable for all three stages of training.

It is estimated that the course will not take more than one year, even with the addition of computer programming. (This depends, of course, on the results of the research).

d. In order to reach the original research goals as laid down under the V.R.A. grant, we are establishing a parallel class for handicapped other than blind. The specific area of training will be determined according to the kind of handicap, e.g.: Deafmutes will be trained to operate the Punch and Verifying machines, handicapped such as post-polio wheelchair cases will be trained in control panel wiring for conventional machines and programming for electronic computers. Each class of handicapped will not comprise more than five trainees. The required level of aptitudes will be similar to that of normal trainees.

e. The course will be conducted as follows: While the blind trainees are studying the first stage, the otherwise handicapped, who are unable to walk, will be trained in the second stage, and while the blind are training in the second stage, the otherwise handicapped will study the third stage.

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R311 RESEARCH ON REHABILITATION
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